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बेलनाकार स्थाई छिद्रों व गोलीय कॉर्नर्स के साथ
परिवर्त्य कठोर धातु (कार्बाइड) के निवेश्य — आयाम
(पहला पुनरीक्षण)

Indian Standard
INDEXABLE HARDMETAL (CARBIDE) INSERTS
WITH ROUNDED CORNERS, WITH
CYLINDRICAL FIXING HOLE — DIMENSIONS
(*First Revision*)

ICS 25.100.01

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BUREAU OF INDIAN STANDARDS
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NATIONAL FOREWORD

This Indian Standard (First Revision) which is identical with ISO 3364 : 1997 'Indexable hardmetal (carbide) inserts with rounded corners, with cylindrical fixing hole — Dimensions' issued by the International Organization for Standardization (ISO) was adopted by the Bureau of Indian Standards on the recommendations of the Single Point Cutting Tools, Carbide Tips and Indexable Inserts Sectional Committee and approval of the Basic and Production Engineering Division Council.

This Indian Standard was first published in 1986 by adopting ISO 3364 : 1985. In order to harmonize the standard with the latest version of ISO 3364, this standard has been revised.

The text of the ISO Standard has been approved as suitable for publication as an Indian Standard without deviations. Certain conventions are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

- a) Wherever the words 'International Standard' appear referring to this standard, they should be read as 'Indian Standard'.
- b) Comma (,) has been used as a decimal marker in the International Standard, while in Indian Standards, the current practice is to use a point(.) as the decimal marker.

In the adopted standard, references appear to certain International Standards for which Indian Standards also exist. The corresponding Indian Standards which are to be substituted in their place are listed below along with their degree of equivalence for the editions indicated:

<i>International Standard</i>	<i>Corresponding Indian Standard</i>	<i>Degree of Equivalence</i>
ISO 513 : 1991 Application of hard cutting materials for machining by chip removal — Designation of the main groups of chip removal and groups of application	IS 2428 : 1999 Application of hard cutting materials for machining by chip removal — Designation of the main groups of chip removal and groups of application (<i>first revision</i>)	Identical
ISO 1832 : 1991 Indexable inserts for cutting tools — Designation	IS 9897 : 2001 Indexable inserts for cutting tools — Designation (<i>second revision</i>)	do

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

**INDEXABLE HARDMETAL (CARBIDE) INSERTS
WITH ROUNDED CORNERS, WITH
CYLINDRICAL FIXING HOLE — DIMENSIONS
(First Revision)**

1 Scope

This International Standard specifies the dimensions of indexable hardmetal (carbide) inserts with rounded corners, with cylindrical fixing hole and with 0° normal clearance. These inserts are primarily intended to be mounted by top and hole clamping or by hole alone on turning and boring tools.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 513:1991, *Application of hard cutting materials for machining by chip removal — Designation of the main groups of chip removal and groups of application.*

ISO 1832:1991, *Indexable inserts for cutting tools — Designation.*

3 Types of insert

The types of indexable hardmetal (carbide) insert specified in this International Standard are the following:

- TN: triangular inserts, with 0° normal clearance;
- SN: square inserts, with 0° normal clearance;
- CN: rhombic inserts, with 0° normal clearance and 80° included angle;
- DN: rhombic inserts, with 0° normal clearance and 55° included angle;
- WN: hexagonal (trigon) inserts, with 0° normal clearance and 80° included angle.

Inserts covered by in this International Standard are standardized with chip breakers on both faces, with chip breakers on one face only and with no chip breakers at all.

At present, neither the shape nor the dimensions of chip breakers are standardized. Thus, if necessary, special features have to be explained by means of a diagram or additional specifications.

Table C.1 gives the range of sizes for these inserts.

4 Interchangeability

4.1 Tolerances

Indexable hardmetal (carbide) inserts specified in this International Standard are provided in tolerance class M in accordance with ISO 1832.

The values of the tolerances in accordance with ISO 1832 are given in annex A.

Other tolerances are given, either in table 1 for hole dimensions, or in tables 2 to 6 for insert dimensions.

4.2 Thickness, s , of inserts with chip breakers

The thickness, s , of inserts with chip breakers is defined as the distance between the cutting edge at the corner and the opposing supporting surface of the insert; see figure 1a) and b) for inserts with chip breakers on one face only and figure 1c) for inserts with chip breakers on both faces.

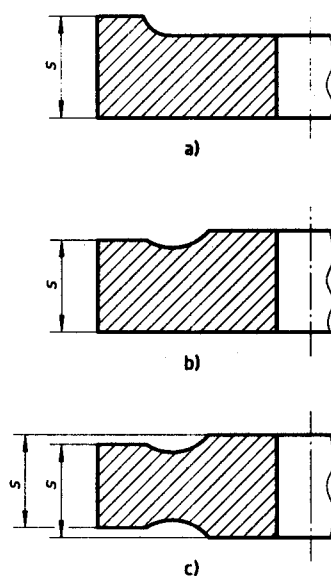


Figure 1

4.3 Fixing hole

In order to guarantee interchangeability when mounting the insert, the diameter d_1 of the fixing hole is related to the diameter d of the inscribed circle of the insert according to table 1.

Table 1 — Fixing hole

Dimensions in millimetres

d	6,35	9,525	12,7	15,875	19,05	25,4
d_1 $\pm 0,08$	2,26	3,81	5,16	6,35	7,94	9,12

5 Designation and marking

5.1 Designation

The designation of the indexable hardmetal (carbide) inserts complying with this International Standard shall conform to ISO 1832.

In addition to this designation, one or both of the following may be indicated:

- the symbol of the group of application, according to ISO 513;
- the commercial designation of the hardmetal (carbide) grade.

5.2 Marking

The following symbols, at least, shall be marked on the insert itself (except when this would be difficult on the smaller inserts):

- symbol of the group of application, or commercial designation of the hardmetal (carbide) grade (or both, if possible, on large inserts).

6 Measurement

Annex B indicates the methods of measuring the dimension m of the indexable inserts covered by this International Standard.

7 Recommended dimensions

The choice of the more common dimensions is restricted to the specifications given in tables 2 to 6. It is strongly recommended that these standard inserts be used wherever possible (first preference). When other inserts are specially required, insert dimensions shall be selected from the non-shaded portions of table C.1 (second preference). Inserts corresponding to dimensions represented by the shaded portions of this table are not recommended.

7.1 Triangular inserts

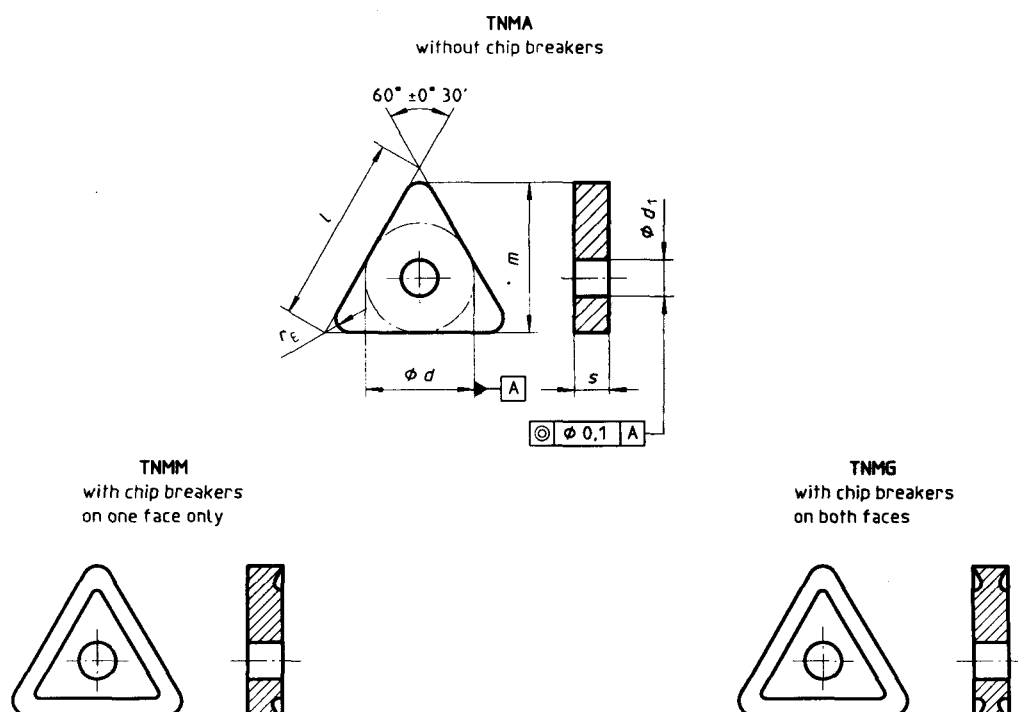


Table 2 — Dimensions of triangular inserts

Dimensions in millimetres

Insert			l ≈	d 1)	s 1)	m 1)	r_e ± 0,1	d_1 ± 0,08
TNMA160404	—	TNMG160404	16,5	9,525	4,76	13,891	0,4	3,81
TNMA160408	TNMM160408	TNMG160408				13,494	0,8	
TNMA160412	TNMM160412	TNMG160412				13,097	1,2	
TNMA220408	TNMM220408	TNMG220408	22	12,7	4,76	18,256	0,8	5,16
TNMA220412	TNMM220412	TNMG220412				17,859	1,2	
TNMA220416	TNMM220416	TNMG220416				17,463	1,6	
—	TNMM270612	—	27,5	15,875	6,35	22,622	1,2	6,35
—	TNMM270616	—				22,225	1,6	

1) Tolerances in accordance with ISO 1832. See annex A.

7.2 Square inserts

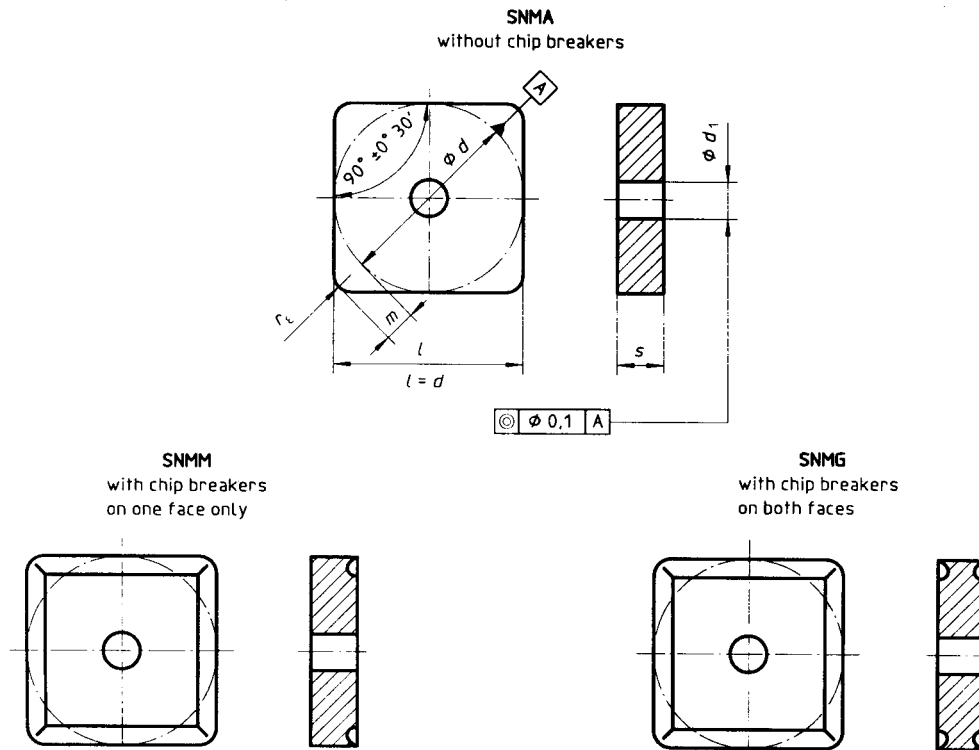


Table 3— Dimensions of square inserts

Dimensions in millimetres

Inserts			d 1), 2)	s 1)	m 1)	r_e $\pm 0,1$	d_1 $\pm 0,08$
—	SNMM090304	SNMG090304	9,525	3,18	1,808	0,4	3,81
—	SNMM090308	SNMG090308			1,644	0,8	
—	—	SNMG120404	12,7	4,76	2,466	0,4	5,16
SNMA120408	SNMM120408	SNMG120408			2,301	0,8	
SNMA120412	SNMM120412	SNMG120412			2,137	1,2	
—	SNMM150608	SNMG150608	15,875	6,35	2,959	0,8	6,35
—	SNMM150612	SNMG150612			2,795	1,2	
SNMA190612	SNMM190612	SNMG190612	19,05	6,35	3,452	1,2	7,94
SNMA190616	SNMM190616	SNMG190616			3,288	1,6	
SNMA250724	SNMM250724	SNMG250724	25,4	7,94	4,274	2,4	9,12

1) Tolerances in accordance with ISO 1832. See annex A.
2) $d = l$

7.3 Rhombic inserts with 80° included angle

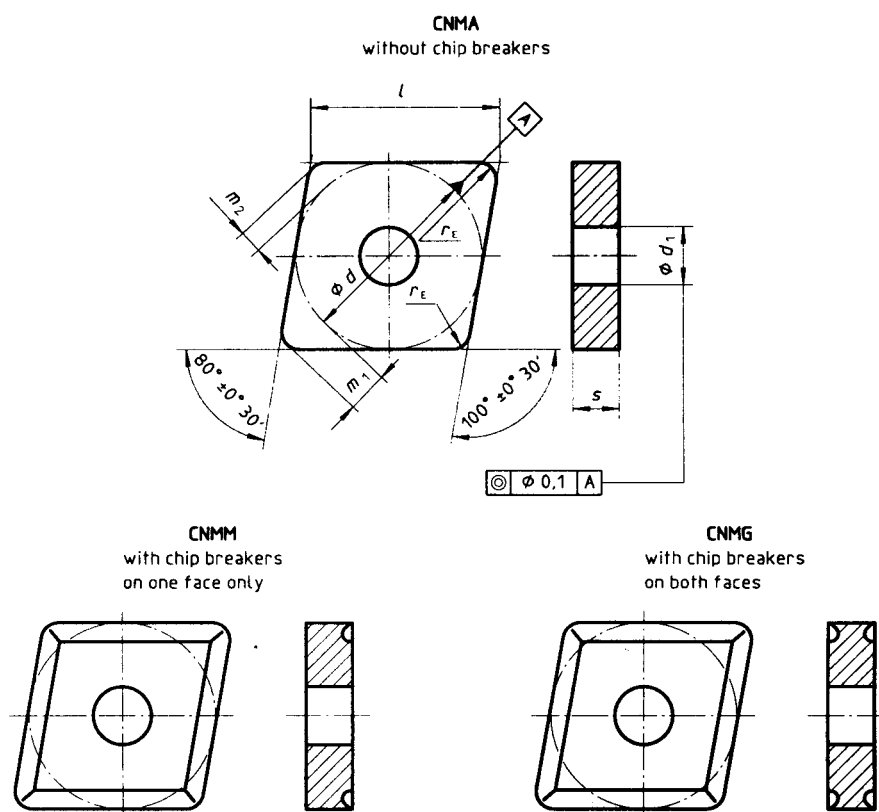


Table 4 — Dimensions of rhombic inserts with 80° included angle

Dimensions in millimetres

Insert			l ≈	d 1)	s 1)	m_1 1)	m_2 1)	r_e ± 0,1	d_1 ± 0,08
—	—	CNMG120404	12,9	12,7	4,76	3,308	1,818	0,4	5,16
CNMA120408	CNMM120408	CNMG120408				3,088	1,697	0,8	
CNMA120412	CNMM120412	CNMG120412				2,867	1,576	1,2	
—	CNMM160608	CNMG160608	16,1	15,875	6,35	3,97	2,182	0,8	6,35
—	CNMM160612	CNMG160612				3,749	2,061	1,2	
—	—	CNMG190608	19,3	19,05	6,35	4,852	2,667	0,8	7,94
CNMA190612	CNMM190612	CNMG190612				4,632	2,545	1,2	
CNMA190616	CNMM190616	CNMG190616				4,411	2,424	1,6	

1) Tolerances in accordance with ISO 1832. See annex A.

7.4 Rhombic inserts with 55° included angle

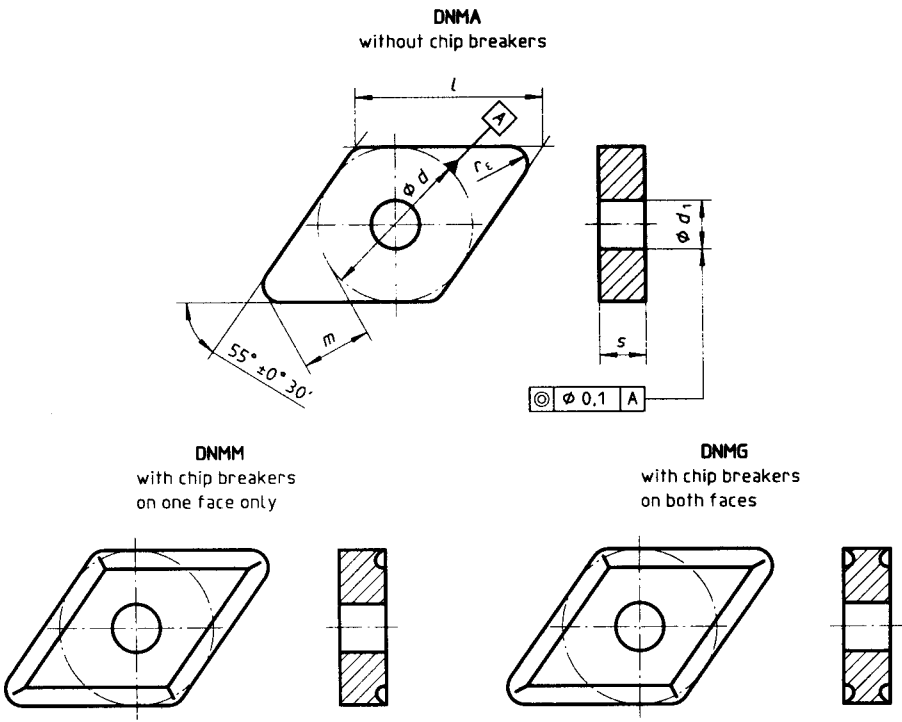


Table 5 — Dimensions of rhombic inserts with 55° included angle

Dimensions in millimetres

Insert			l ≈	d 1)	s 1)	m 1)	r_E ± 0,1	d_1 ± 0,08
DNMA150604	—	DNMG150604	15,5	12,7	6,35	6,939	0,4	5,16
DNMA150608	DNMM150608	DNMG150608				6,477	0,8	
DNMA150612	DNMM150612	DNMG150612				6,014	1,2	
DNMA150616	DNMM150616	DNMG150616				5,552	1,6	

1) Tolerances in accordance with ISO 1832. See annex A.

7.5 Hexagonal (trigon) inserts with 80° included angle

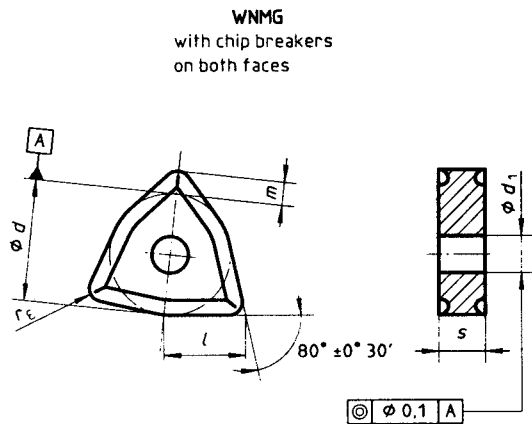


Table 6 — Dimensions of hexagonal (trigon inserts) with 80° included angle

Dimensions in millimetres

Insert	l ≈	d 1)	s 1)	m 1)	r_E ± 0,1	d_1 ± 0,08
WNMG060404	6,5	9,525	4,76	2,426	0,4	3,81
WNMG060408				2,205	0,8	
WNMG080404	8,7	12,7	4,76	3,308	0,4	5,16
WNMG080408				3,087	0,8	
WNMG080412				2,867	1,2	

1) Tolerances in accordance with ISO 1832. See annex A.

Annex A
(normative)

Tolerances for d , m , m_1 , m_2 and s
(Taken from ISO 1832)

Table A.1 — Tolerances for d , m , m_1 , m_2 and s

Dimensions in millimetres

Insert		Tolerances class M for		
Designation	d	d	m , m_1 and m_2	s
TNM. 16.. SNM. 09.. WNM. 06..	9,525	$\pm 0,05$	$\pm 0,08$	$\pm 0,13$
TNM. 22.. SNM. 12.. CNM. 12.. WNM. 08..	12,7	$\pm 0,08$	$\pm 0,13$	
DNM. 15..			$\pm 0,15$	
TNM. 27.. SNM. 15.. CNM. 16..	15,875	$\pm 0,1$	$\pm 0,15$	
SNM. 19.. CNM. 19..	19,05	$\pm 0,1$	$\pm 0,15$	
SNM. 25..	25,4	$\pm 0,13$	$\pm 0,18$	

Annex B (normative)

Methods of measurement of " m " dimension

B.1 Triangular inserts

Dimension m is related to the side opposite the corner that is to be measured. The insert is placed on a surface plate as shown in figure B.1 and checked by means of a dial gauge zeroed with the aid of a gauge block corresponding to dimension m . The dial gauge then gives a reading of the error when applied to the insert to be measured.

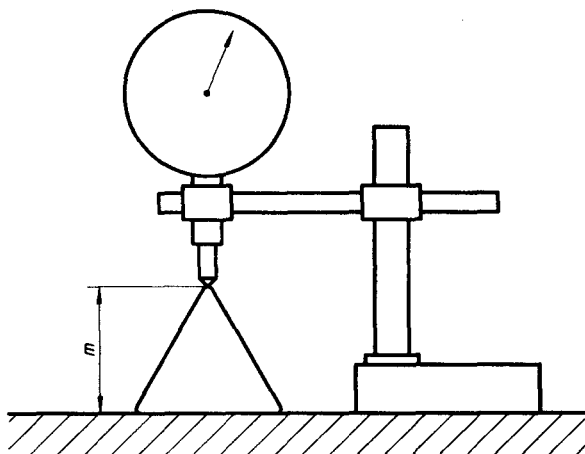


Figure B.1

B.2 Square inserts

Dimension m is checked by reference to the diameter d of a precision roller, where d corresponds to the nominal diameter of the inscribed circle of the insert. The insert is mounted on a 90° vee-block as shown in figure B.2 and checked by means of a dial gauge which has been zeroed to dimension m by means of a roller with the aid of a gauge block. The dial gauge then gives a direct reading of the error when applied to the inserts to be measured. The roller has a tolerance of $\pm 0,002$ mm.

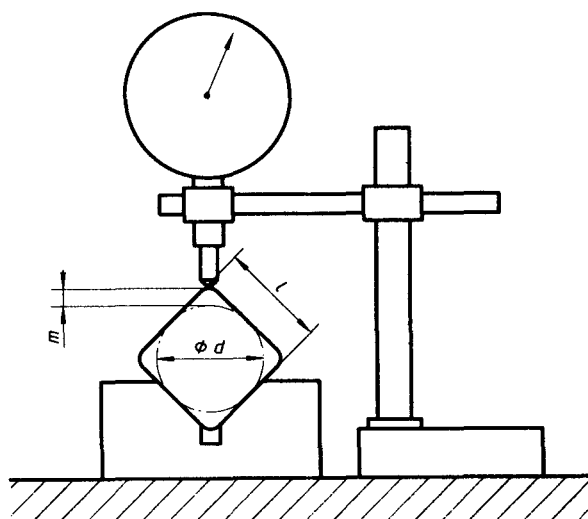


Figure B.2

B.3 Rhombic inserts

Dimension m , m_1 or m_2 is checked by reference to the diameter d of a precision roller, where d corresponds to the nominal size of the inscribed circle of the insert. The insert is mounted on a 55° , 80° or 100° vee-block as shown in figure B.3 and checked by means of a dial gauge which has been zeroed to dimension m , m_1 or m_2 by means of a roller with the aid of a gauge block. The dial then gives a direct reading of the error when applied to the inserts to be measured. The roller has a tolerance of $\pm 0,002$ mm.

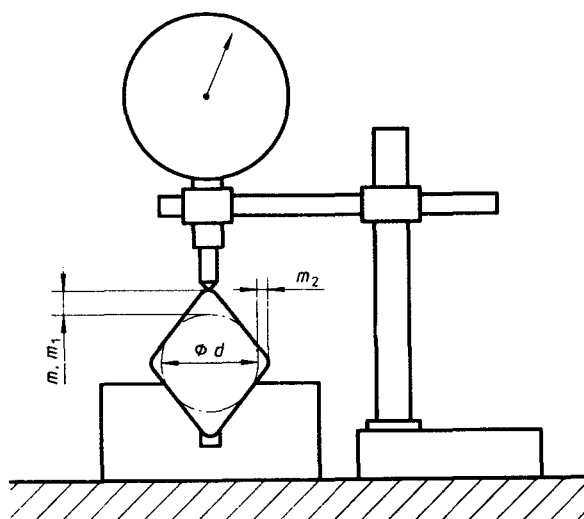


Figure B.3

B.4 Round inserts

Diameter d is measured with a micrometer or a similar device.

B.5 Hexagonal inserts

Dimension m is checked by reference to the diameter d of a precision roller, where d corresponds to the nominal size of the inscribed circle of the insert. The insert is mounted on a 160° vee-block as shown in figure B.4 and checked by means of a dial gauge which has been zeroed to dimension m by means of a roller with the aid of a gauge block. The dial then gives a direct reading of the error when applied to the inserts to be measured. The roller has a tolerance of $\pm 0,002$ mm.

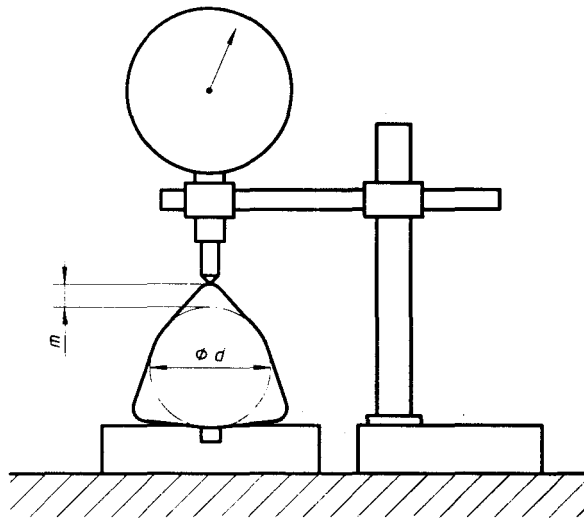


Figure B.4

Annex C

(normative)

Range of sizes of inserts with rounded corners with cylindrical fixing hole, with shapes covered by this International Standard

Table C.1 — Range of sizes

Dimensions in millimetres

<i>d</i>	Without chip breakers (A)							With chip breakers on one face only (M)							With chip breakers on both faces (G)						
	Designation	Corner radius r_{ϵ}						Designation	Corner radius r_{ϵ}						Designation	Corner radius r_{ϵ}					
		$\frac{d}{2}$	0,4	0,8	1,2	1,6	2,4		0,4	0,8	1,2	1,6	2,4	$\frac{d}{2}$		0,4	0,8	1,2	1,6	2,4	
6,35	TNMA1103	—						TNMM1103						TNMG1103	—						
9,525	TNMA1603							TNMM1603						TNMG1603							
	TNMA1604		+	+	+			TNMM1604		+	+			TNMG1604		+	+	+			
12,7	TNMA2204			+	+	+		TNMM2204		+	+	+		TNMG2204			+	+	+		
15,875	TNMA2706							TNMM2706			+	+		TNMG2706							
19,05	TNMA3309							TNMM3309						TNMG3309							
9,525	SNMA0903	—						SNMM0903	+	+				SNMG0903	—	+	+				
12,7	SNMA1203							SNMM1203						SNMG1203							
	SNMA1204			+	+			SNMM1204		+	+			SNMG1204		+	+	+			
15,875	SNMA1504							SNMM1504						SNMG1504							
	SNMA1506							SNMM1506		+	+			SNMG1506			+	+			
19,05	SNMA1906				+	+		SNMM1906			+	+		SNMG1906				+	+		
25,4	SNMA2507						+	SNMM2507					+	SNMG2507						+	
	SNMA2509							SNMM2509						SNMG2509							
12,7	CNMA1204	—		+	+			CNMM1204		+	+			CNMG1204	—	+	+	+			
15,875	CNMA1606							CNMM1606		+	+			CNMG1606			+	+			
19,05	CNMA1906				+	+		CNMM1906			+	+		CNMG1906			+	+	+		
25,4	CNMA2509							CNMM2509						CNMG2509							
12,7	DNMA1504	—						DNMM1504						DNMG1504	—						
	DNMA1506		+	+	+	+		DNMM1506		+	+	+		DNMG1506		+	+	+	+		
15,875	DNMA1906							DNMM1906						DNMG1906							
9,525														WNMG0604	—	+	+				
12,7														WNMG0804	—	+	+	+			



First preference in this International Standard (see tables 2 to 6).



Non-shaded squares: second preference; not covered by this International Standard.



Shaded squares: inserts not recommended.

Annex D
(informative)

Bibliography

- [1] ISO 883:1995, *Indexable hardmetal (carbide) inserts with rounded corners, without fixing hole — Dimensions.*
- [2] ISO 3365:1985, *Indexable hardmetal (carbide) inserts with wiper edges, without fixing hole — Dimensions.*
- [3] ISO 6987-1:1983, *Indexable hardmetal (carbide) inserts with rounded corners, with partly cylindrical fixing hole — Part 1: Dimensions of inserts with 7 degrees normal clearance.*

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